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HM-647

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Uwe PLociennik, et al.

Serial No: 10/537,521

Filed: June 3, 2005

For: METHOD FOR PROCESS CONTROL OR PROCESS REGULATION OF A UNIT FOR MOULDING, COOLING AND/OR THERMAL TREATMENT OF METAL

Examiner: Sheela S. Rao

Art Unit: 2123

Mail Stop: Appeal Brief-Patents
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

BRIEF ON APPEAL

S I R:

Applicant hereby requests a one-month extension of time for filing the present Brief on Appeal. Enclosed is a credit card payment form in the amount of $130 in payment of the government fee for a one-month extension of time.

03/11/2010 SDENBOB3 00000002 10537521
01 FC:1251 130.00 OP
02 FC:1402 540.00 OP

This appeal is taken from the Final Action mailed June 2, 2009.

Real Party in Interest

The real party in interest in the above-identified application is:

SMS Demag AG
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Germany

Related Appeals and Interferences

There are no related appeals or interferences of which Applicant is aware regarding the above-identified application.

Status of Claims

Claims 1-9 are pending in the application and are subject to the present appeal. Claims 1-5 and 9 stand rejected under 35 U.S.C. 103(a) over US Patent Application Publication No. US 2003/0089431 A1 to Gramckow et al. in view of U.S. Patent No. 5,357,443 to Watanabe et al. Claims 6-8 stand rejected under 35 U.S.C. 103(a) over Gramckow et al. and Watanabe et al., and further in view of U.S. Patent No. 5,804,727 to Lu et al.

Status of Amendments After Final Rejection

A response after final was filed and entered by the Examiner.

Summary of the Claimed Subject Matter

The claimed invention will now be summarized with reference to the drawings being made by way of reference numerals.

Independent Claim 1

The claimed invention recites a method for adjusting microstructural properties of a metal 1 produced in an

installation for shaping, cooling, and/or heat treatment of the metal (see page 3, lines 4-6 of the specification). The installation is equipped with actuators 5.1, 5.2 (page 9, line 30) for setting specific operating parameters, and the corresponding method process is based on a method model, with which suitable process control and/or process regulation variables for acting on the actuators 5.1, 5.2 are determined online with computer assistance after relevant measured values have been detected (page 3, lines 14-21). The method includes detecting at least one current actual microstructural characteristic value 2 that provides information about the metal microstructure online at an end of or during a corresponding method process as a relevant measured value (page 4, lines 6-15) and, depending on the relevant value and using a microstructure model and the method model on which the process is based, exerting an effect on the actuators 5.1, 5.2 of the method process in order to adjust desired microstructural properties of the metal (page 4, line 16 - page 5, line 1), such that the following can be nondestructively detected as the actual microstructural characteristic value: a microstructural grain size value, and/or a microstructural transformation time or the microstructural transformation time interval (page 5, lines 2-5).

Grounds of Rejection to be Reviewed on Appeal

The following grounds are presented for review:

Whether claims 1-5 and 9 are unpatentable under 35 U.S.C. 103(a) over Gramckow et al. in view of Watanbe et al.

Whether claims 6-8 are unpatentable under 35 U.S.C. 103(a) over Gramckow et al. in view of Watanbe et al., and further in view of Lu et al.

Argument

The Rejection of Claims 1-5 and 9 under 35 U.S.C. 103(a):

In rejecting claims 1-5 and 9, the Examiner stated the following in the final rejection:

"Gramckow et al. (hereinafter "Gramckow") teach of a method and device for controlling and/or regulating a metal strip as it is being rolled in a rolling machine.

Claim 1 cites a method for adjusting microstructural properties of a metal produced in the process control or process regulation of an installation for shaping, cooling, and/or heat treatment of the metal, wherein the installation is equipped with actuators for setting specific operating parameters, and the corresponding method process is based on a method model, with which suitable process control and/or process regulation variables for acting on the actuators are determined online with computer assistance after relevant measured values have been detected, comprising the steps of: detecting at least one current actual microstructural characteristic value that provides information about the metal microstructure online at an end of or during a corresponding method process as a relevant measured value; and depending on the relevant value and using a microstructure model and the method model on which the process is based, exerting an effect on the actuators of the method process in order to adjust desired microstructural properties of the metal, such that the following can be nondestructively detected as the actual microstructural characteristic value:

a microstructural grain size value, and/or

a microstructural transformation time or the microstructural transformation time interval,

the microstructural transformation.

Gramckow teaches of controlling the process based upon sensed and/or detected conditions during the processing of the metal strip, then comparing the processing to a model, so as to change the process parameters to achieve the desired properties of the metal during

the processing itself as shown in Fig. 3 and explained beginning in paragraph [0034]. However, Gramckow does not specifically state the microstructural characteristic values and models as per the limitations of the instant claim. Watanbe teaches this beginning in column 3 in relation to Fig. 1, the treatment or processing of steel or the metal is taught at line 11 as being either heat treatment, rolling, and/or cooling. The method models used to estimate the properties is listed beginning at line 47. The step of detecting an actual microsturctural characteristic value is taught as being computed by estimating the state of the metallic structure as per col. 4: II. 1-4. The various characteristics of the structure are defined in line 11 of column 4. The last step of exerting an effect on the actuators is taught in column 5 lines 7-16. The process of computing the results of a model from a previous step or structure is carried through. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used the microstructure models and characteristic values as taught by Watanbe with the real-time controlling/regulating process of Gramckow so as to gain the advantage of cooling conditions which correspond better to the actual conditions during processing itself as indicated by Gramckow in paragraph [0010].

Claim 2 specifies the microstructural grain size as the microstructural grain size value for the steel group of C-Mn steel. Watanbe teaches such in col. 4: II. 24-25, and col. 5: II. 22-36.

Claim 3 includes detecting the site or the time interval of the beginning and end of the microstructural transformation with several detection units. Watanbe teaches the step of detecting with several detection units by showing the construction and computation of the model in a variety of units. Examples of the model being processed through different units in each of the 1 steps is taught beginning at line 64 of column 3.

Claim 4 is directed to the process of carrying out the online microstructural control in a cooling line of a wire mill with a water-cooled segment of the cooling line and an air-cooled segment of the cooling line, detecting wherein a current microstructural grain size value of the metal after passage through the water-cooled segment of the cooling line by means of an ultrasonic measuring instrument, and detecting wherein the temperature of a microstructural transformation and a course of the microstructural transformation, with respect to time with temperature measuring devices that can be moved in the direction of conveyance of the metal

and/or variably oriented. Watanbe teaches this aspect of the instant invention beginning at line 25 in column 10.

Claim 5 states including comparing an actual value and a set value, and wherein if the comparison of the actual value and the set value reveals a difference that exceeds a certain value, carrying out an online adaptation of the method model and/or the microstructure model as a function of the detected value that provides information about the microstructure. This aspect of the claimed invention is taught at lines 37-43 in column 8.

Claim 9 includes the detecting of the microstructural transformation temperature with at least one temperature detection unit, which is movable longitudinally with respect to the direction of metal conveyance and is positioned as a function of the site of the microstructural transformation that is expected based on the microstructure model. Watanbe teaches this at column 6, lines 34-68."

Gramckow et al., disclose a method for controlling and/or regulating the cooling stretch of a hot strip rolling mill for rolling metal strip.

The patent to Watanbe et al., discloses a model or method of estimating the properties of a steel product. This reference was discussed at length in the last filed amendment, and those comments are incorporated by reference.

The Examiner combined Gramckow et al. with Watanbe et al. in determining that claims 1-5 and 9 would be unpatentable over such a combination. Applicant submits that the combination of references relied upon by the Examiner does not teach the

presently claimed invention. Although Gramckow et al. appear to teach some type of method for adjusting micro-structural properties, the Examiner on page 4 of the Office Action admits that Gramckow et al. do not specify micro-structural properties as recited in claim 1 of the present application. The Examiner relies on Watanbe et al. as teaching the detection of actual micro-structural characteristic values. However, the section of Watanbe et al. relied on by the Examiner (col. 4, lines 1-4) does not teach detecting an actual micro-structural characteristic value, but instead only teaches "to automatically estimate the state of the metallic structure". There is no teaching of a method that measures actual micro-structural characteristic values, as in the presently claimed invention.

There is no indication or suggestion to take an actual value, to compare this detected actual value with one value of (stored) predetermined set values and in case that this comparison reveals a difference to carry out process controlling based on this difference by acting on installation actuators.

Watanbe et al. only teach "to automatically estimate the state of the metallic structure". There is no detection of an actual microstructural characteristic value, as in the presently

claimed invention. In fact, the reference at column 10, lines 42-44, states that it is an objective to avoid testing and measuring in a finished product.

In view of these considerations it is submitted that the rejection of claims 1-5 and 9 under 35 U.S.C. 103(a) over a combination of the above-discussed references is in error and should be overturned.

The Rejection of Claims 6-8 under 35 U.S.C. 103(a):

In rejecting claims 6-8, the Examiner stated the following in the final rejection:

"As with claims 6-8, the use of specific type of measuring instruments is claimed. Claim 6 specifies the detecting step to be done with an ultrasonic or x-ray measuring device. Claim 7 defines the detecting step to be done by detecting linear expansion of the metallic lattice that is associated with the transformation using the measuring instruments that contact the metal. And claim 8 further defines the measuring instruments as being rolling force measuring devices or measuring rollers. Although Watanbe teaches the use of rollers for the rolling process and measuring devices for measuring metallic properties, the prior art fails to specifically teach the use of the devices as per claims 6-8. For this reason, the prior art of Lu et al. (hereinafter "Lu") is relied upon. Lu teaches of a method for determining and evaluating physical characteristics of a material, especially from manufacturing processes as rolling, etc. In operation, an ultrasonic wave is created for use and measured to determine the physical characteristics of the

texture, grain size, and crystal lattice structure, as stated in the abstract and in col. 4: II. 16 et seq. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used the measuring devices as used by Lu in the method of Gramckow/Watanbe so as to provide a more accurate high resolution method for determination and evaluation of physical characteristics without the use of destructive methods."

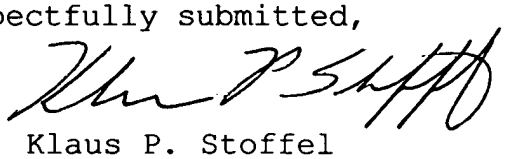
Claims 6-8 stand and fall with independent claim 1. Applicant submits that Lu et al. add nothing to the teachings of the previously discussed references so as to suggest the presently claimed invention. Thus, it is submitted that the rejection of claims 6-8 under 35 U.S.C. 103(a) is in error and should be overturned.

Conclusion

Accordingly, in view of the above considerations, it is Applicant's position that the Examiner's rejections of claims 1-9 under 35 U.S.C. 103(a) are in error and should be reversed.

The amount of $540.00 to cover the fee for filing an appeal brief is being charged as per attached form PTO-2038. Any additional fees or charges required at this time in connection with this application should be charged to Patent and Trademark Office Deposit Account No. 11-1835.

Respectfully submitted,

By 

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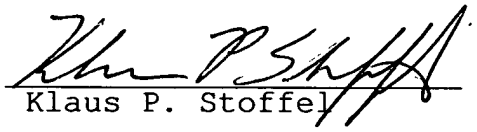
Dated: March 8, 2010

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, PO Box 1450 Alexandria, VA 22313-1450, on March 8, 2010.

By: 
Klaus P. Stoffel

Date: March 8, 2010

Claims Appendix

1. Method for adjusting microstructural properties of a metal produced in an installation for shaping, cooling, and/or heat treatment of the metal, wherein the installation is equipped with actuators for setting specific operating parameters, and the corresponding method process is based on a method model, with which suitable process control and/or process regulation variables for acting on the actuators are determined online with computer assistance after relevant measured values have been detected, comprising the steps of: detecting at least one current actual microstructural characteristic value that provides information about the metal microstructure online at an end of or during a corresponding method process as a relevant measured value; and, depending on the relevant value and using a microstructure model and the method model on which the process is based, exerting an effect on the actuators of the method process in order to adjust desired microstructural properties of the metal, such that the following can be nondestructively detected as the actual microstructural characteristic value:

- a microstructural grain size value, and/or
- a microstructural transformation time or the microstructural transformation time interval.

2. Method in accordance with Claim 1, wherein austenitic grain size is determined as the microstructural grain size value for the steel group of a C-Mn steel.

3. Method in accordance with Claim 1, including detecting a site or the time interval of the beginning and end of the microstructural transformation with several detection units.

4. Method in accordance with Claim 1, including carrying out online microstructural control out in a cooling line of a wire mill with a water-cooled segment of the cooling line and an air-cooled segment of the cooling line, detecting a current microstructural grain size value of the metal wire after passage through the water-cooled segment of the cooling line by means of an ultrasonic measuring instrument, and detecting the temperature of a microstructural transformation and a course of the microstructural transformation, with respect to time with temperature measuring devices that can be moved in the direction of conveyance of the metal and/or variably oriented.

5. Method in accordance with Claim 1, including comparing an actual value and a set value, and if the comparison of the

actual value and the set value reveals a difference that exceeds a certain value, carrying out an online adaptation of the method model and/or the microstructure model as a function of the detected value that provides information about the microstructure.

6. Method in accordance with claim 1, including detecting the microstructural grain size value with ultrasonic or x-ray measuring instruments.

7. Method in accordance with claim 1, including detecting the microstructural transformation time or the microstructural transformation time interval by detecting linear expansion of the metallic lattice that is associated with the transformation using measuring instruments that contact the metal.

8. Method in accordance with claim 7, wherein the measuring instruments are rolling force measuring devices or measuring rollers.

9. Method in accordance with claim 1, including detecting the microstructural transformation temperature with at least one temperature detection unit, which is movable longitudinally with

respect to the direction of metal conveyance and is positioned as a function of the site of the microstructrual transformation that is expected based on the microstructure model

Evidence Appendix

N.A.

Related Proceedings Appendix

There are no related proceedings.